

pendulum; (4) the Wiechert pendulum, weighing 1000 kilograms, with a mechanical register; (5) the three-component microseismograph of Vicentini; (6) the Omori horizontal pendulum; (7) the Bosch horizontal pendulum (tromometer) weighing 100 kilograms; (8) the trifilar gravimeter of August Schmidt.

These instruments, which are all in active use, are giving accurate comparative observations; their seismograms, when carefully discussed, form a valuable collection.

The instruments and records of the central station are at the disposal of foreign visitors, especially citizens of the States associated in this work, who wish to use them for special study, with the restriction that the regular records of the instruments are to be undisturbed. The workrooms of the central bureau are open to foreign visitors for scientific, practical, or theoretical researches; the collection of seismograms of the central station may always be consulted by them.

In accordance with these provisions the geophysicist and seismologist, Doctor Pécs, was sent by the Hungarian government to study at the central bureau for several weeks in order that he might make use of the records, with the assistance of the personnel of the central bureau and the central station. Professors Omori and Michailovitch intend to work at the central bureau for some time.

The principal work of the central bureau, as prescribed by its director, is at present directed toward the study of apparatus, and has for its object the enlargement of our knowledge of instruments and improvements in their use. Negotiations have been begun for the purpose of engaging a seismologist of great reputation to pursue extensive works of this nature at the central bureau with the apparatus of the central station.

These two institutions are distinct organizations, but their work is along parallel lines. The Imperial German Central Station places at the disposal of the Central Bureau of the International Seismological Association its instruments, its records, and in part its quarters; and on the other hand the central bureau, its rooms, and its personnel are of considerable service to the central station. Much work that is of great importance to the better understanding of the seismometry of our globe, which is the principal object of the Seismological Association, could only be carried on by the active cooperation of the two institutions, and work of all kinds is facilitated by this combined activity.

Literary works also are incumbent upon the central bureau; several have already been completed or are about to be; these works have as a basis the records and the researches of the central station. The central station is publishing at the present time, in the *Beiträge zur Geophysik*, a catalogue of all the microseismic earthquakes known to have occurred in eastern Asia; this catalogue, composed by Professor Rudolph, will be continued. The catalogue of earthquakes observed during the year 1903, begun by Rudolph (*Beiträge zur Geophysik*, Supplement III), will be continued for following years by the central bureau and a catalogue of all microseismic movements will be prepared.

In order that these works may be as complete as possible, the central bureau earnestly requests all delegates appointed by the cooperating nations to see that the most exact information regarding seismological observations in their respective countries be transmitted to the central bureau at the end of each half year, or better still, each quarter year. The most practical manner of attaining this object will be to send copies of all seismic perturbations of considerable importance registered by the different stations; they will be preserved at the central bureau and will be placed at the disposal of all who need them in their studies or researches.

The central bureau will also be much pleased to receive published works bearing on seismology, particularly investigations of different countries or of the entire globe. These works will form the nucleus of the future library of the central bureau.

ASTRONOMY versus METEOROLOGY.

The Astronomical Association, organized in 1865 in Germany, and the Royal Astronomical Society of London, organized in 1820, publish annually condensed reports of the work done by the more prominent astronomical observatories in the world. The last number of the Notices of the London society and the last *Vierteljahrsschrift* of the German society give such reports from 27 English and 39 continental institutions, respectively. Although astronomy is the prime work of all of these, and although some of them necessarily pay special attention to atmospheric conditions, in so far as they affect astronomical work, yet only a few maintain regular meteorological observations comparable with those of our regular stations. Nevertheless the fact that 13 out of the 27 English, and 10 out of the 39 continental observatories do maintain such series is an interesting evidence of the intimate relation between the two branches of science. In many of these cases the meteorological record is continued by the observer as a

pious duty, in view of its having been begun many years ago when the astronomer was the accurate observer of all geological phenomena, and when men looked to him for information with regard to earthquakes, terrestrial magnetism, and the weather, as well as the stars. In recent years each of these has become a special branch of science, requiring a special building and instruments. It is, however, very fortunate for meteorology that the astronomer, with his accurate instruments, can frequently give measurements from which meteorologists derive great benefit. Very few of the latter have at hand apparatus for determining the exact angular dimensions of halos, the absorption bands due to the air and the vapor, the exact location of a meteor train, the altitude and azimuth of the twilight arc, the degree of polarization of the skylight, or the ordinary phenomena of refraction and the extraordinary refractions of the mirage. For information on these and other points we generally depend on the astronomer, or some individual physicist; but it is to be hoped that we may eventually have many meteorological institutions where these matters are properly attended to. The so-called regular observations, that have been made since the days of Ferdinand II, the Grand Duke of Tuscany, who organized the first system of stations in 1653, certainly need to be supplemented by observations in every field that modern science has opened up to meteorological research.—C. A.

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a —

Bulletin of the American Geographical Society. New York. Vol. 33. Aug., 1906.

Ward, Robert DeCourcy. The classification of climates. II. Pp. 465-477.

Journal of the Meteorological Society of Japan. Tokyo. 25th year. July, 1906.

Takagi, T. On the dust-haze (Hoang sha) in the Yangtze Valley. [Japanese.]

London, Edinburgh, and Dublin Philosophical Magazine. London. 6 ser. Vol. 12. Sept., 1906.

Eve, A. S. On the radioactive matter in the earth and the atmosphere. Pp. 189-200.

Nature. London. Vol. 74. Aug. 30, 1906.

— Meteorological kites in India. P. 448.

Physical Review. Lancaster. Vol. 23. Aug., 1906.

Joslin, Lulu B. The contemporaneous variations of the nucleations and the ionization of the atmosphere of Providence. Pp. 154-165.

Science. New York. New Series. Vol. 24. June 24, 1906.

Smith, D. T. The source of the energy of cyclones. Pp. 247-248.

Science Abstracts. London. Vol. 9. Aug., 1906.

B[utler], C. P. Eclipse shadow bands. [Abstract of article by M. Roso de Luna.] P. 402.

Scientific American. New York. Vol. 95. Aug. 25, 1906.

— The effect of the sea upon climate. Pp. 130-131.

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Moureaux, Th. Observations magnétiques pendant l'éclipse de soleil du 30 août 1905. Pp. 113-115.

Besson, Louis. Halos et taches solaires. Pp. 115-119.

Angot, Alfred. Régime pluviométrique de la Méditerranée. II. Tripolitaine. Pp. 119-122.

Goutureau, Ch. Sur la variabilité de la température. Pp. 122-127.

Marchand, E. L'électricité atmosphérique au Pic du Midi (2860 m.). Pp. 137-146.

Brunhes, Bernard. Sur la dissymétrie de la déperdition électrique en montagne. Nouvelles observations faites aux environs de Nauriac. Pp. 147-149.

- Wellman, Walter.** Discours prononcé par M... à la séance de la Société météorologique du 5 juin 1906. Pp. 161-168.
- Chauveau, A. B.** Sur le climat de la région de Hué (Annam). Pp. 168-175.
- Archives des Sciences Physiques et Naturelles.** Genève. 4 période. Tome 22. 15 août 1906.
- Gautier, R., and Duaime, H.** Observations météorologiques faites aux fortifications de Saint-Maurice pendant l'année 1905. Résumé annuel. Pp. 163-184.
- La Nature.** Paris. 34 année. 18 août 1906.
- Febre, L. A.** Elaboration des sources par les montagnes et forêts. Pp. 182-186.
- Reboul, Paul.** Notes sur la sismologie. Pp. 187-190.
- Revue Néphologique.** Mons. Août 1906.
- Péroux, E.** Verres colorés pour l'observation des nuages. P. 57.
- Bracke, A.** Les nuages invisibles. Pp. 57-59.
- Nell, Chr. A. C.** Périodicité des bandes polaires. Pp. 59-61.
- Westman, J.** Forme et grandeur des cristaux de neige au Spitzberg. Pp. 1-63.
- Beiblätter zu den Annalen der Physik.** Leipzig. Band 30. 1906.
- Danckwörtt, A.** Einfache Bestimmung des spezifischen Gewichtes der Luft. [Abstract of article by G. Junge.] P. 802.
- Gaea.** Leipzig. 42 Jahrgang. 1906.
- Die Vorgeschichte des allgemeinen Windgesetzes. Pp. 527-533.
- Illustrirte Aeronomische Mitteilungen.** Strassburg. 10 Jahrgang. Aug., 1906.
- Ritter, Friedrich.** Flächengröße und Winddruck. Pp. 274-280.
- Meteorologische Zeitschrift.** Braunschweig. Hann-Band. 1906.
- Mohn, H[enrik].** Studien über die Dämmerung. Pp. 1-22.
- Schwab, Franz.** Ueber die Verdunstungsmessungen in Kremsmünster. Pp. 23-35.
- Obermayer, A[lbert] von.** Zur Beobachtung und zur Photograpie von Lichtkränzen und Gegensonnen. Pp. 35-40.
- Schreiber, Paul.** Untersuchung über die Genaugigkeit des Tages-, Monats- und Jahresmittel aus den Temperaturbeobachtungen für die drei Stundenkombinationen: $6a - 2p - 10p$, $8a - 2p - 8p$ und $8a - 2p - 9p$. Pp. 40-59.
- Hegyfoky, J.** Ueber Berg- und Talwinde in Ungarn. Pp. 59-67.
- Neumayer, G[eorg] von.** Die geologisch-magnetischen Verhältnisse des einstigen erdmagnetischen Observatoriums in Hobart (Tasmanien). Pp. 67-80.
- Sprung, A[dolf].** Ueber eigentümliche Gleichgewichtszustände bei den in Wagebarographen verwendeten Barometern. Pp. 80-86.
- Mack, K[arl].** Ergebnisse zehnjähriger Windregistrierung in Hohenheim. Pp. 87-90.
- Augustin, Fr[antisek].** Die Niederschläge in Prag. Pp. 90-94.
- Hepites, St[efan] C.** Les sécheresses en Roumanie. Pp. 95-97.
- Paulsen, Adam.** Die dänischen Wasserstandsmessungen und einige Resultate derselben mit Bezug auf den Einfluss des Windes auf die Höhe des Wasserstandes. Pp. 97-110.
- Kesslitz, W[ilhelm].** Ergebnisse der luftelektrischen Messungen in Pola. Pp. 111-117.
- Hildebrandsson, Hildebrand H.** Sur la circulation des couches supérieures de l'air au dessus du maximum de l'Atlantique Nord. Pp. 117-120.
- Eliot, John.** Brief discussion of the observations of the solar radiation (or black bulb in vacuo) thermometers in India during the period 1892-1903. Pp. 124-130.
- Angot, Alfred.** Étude sur la variation diurne de la température. Pp. 130-145.
- Danckelman, A[lexander] von.** Die Niederschlagsverhältnisse des Schutzgebietes Togo. Pp. 145-151.
- Rona, S[ig].** Die südungarische Kossava. Pp. 151-162.
- Mazille, Eduard.** Temperatur von Triest nebst einem Beitrag zur Kenntnis des Temperaturunterschiedes Stadt-Land. Pp. 162-174.
- Rykatchew, M[ichael].** Note préliminaire sur les inversions de la température d'après les observations faites au moyen de cerfs-volants à Pavlovsk en 1904. Pp. 174-179.
- Steen, Aksel S.** Die Sonnenfleckperiode der Gewitter. Pp. 179-180.
- Liznar, J[joseph].** Ueber die Darstellung der Verteilung der erdmagnetischen Kraft auf einem Gebiete auf Grund von Messungen an wenigen Orten. Pp. 181-186.
- Voeikov, A[leksandr].** Die Verteilung und Akkumulation der Wärme in den Festländern und Gewässern der Erde. Pp. 187-208.
- Shaw, W[illiam] N[apier].** The law of sequence in the yield of wheat for eastern England. 1885-1904. Pp. 208-216.
- Teisserenc de Bort, Léon.** Sur la circulation générale de l'atmosphère. Relations entre la température et la pression de l'air à la surface du globe et dans l'atmosphère libre. Pp. 216-228.
- Ekhholm, Nils.** Die Luftdruckschwankungen und deren Beziehung zu der Temperatur der oberen Luftsichten. Pp. 228-242.
- Margules, Max.** Ueber Temperaturschichtung in stationär bewegter und ruhender Luft. Pp. 243-254.
- Abbe, Cleveland.** The trade winds and the doldrums. Pp. 254-260.
- Exner, Felix M.** Die jährliche Luftverschiebung über einigen Orten Europas. Pp. 260-267.
- Bemmelen, W[illem van].** Erdmagnetische Pulsationen. Pp. 268-270.
- Rotch, A. Lawrence, and Teisserenc de Bort, L[éon].** The meteorological conditions above the tropical North Atlantic. Pp. 270-275.
- Riggenbach, A[lbert].** Die tägliche Periode des Niederschlags in Basel. Pp. 276-279.
- Bezold, Wilhelm von.** Ueber Strahlungsnormalen und Mittellinien der Temperatur. Pp. 279-287.
- Kremser, V[ictor].** Ueber die Schwankungen der Lufttemperatur in Norddeutschland von 1851 bis 1900. Pp. 287-305.
- Assmann, Richard.** Die Temperatur der Luft über Pawłowsk und über Berlin im Jahre 1904. Pp. 305-336.
- Trabert, Wilhelm.** Benutzung des täglichen Temperaturganges zur Ermittlung der diffusen Wärmestrahlung. Pp. 336-339.
- Süring, R.** Über die Aufeinanderfolge von Gewitterzügen. Pp. 339-347.
- Köpen, W[ladimir].** Wie erkennt man Blindlingsprognosen? Pp. 347-356.
- Stelling, Ed.** Ueber die Bestimmung der Schwerekorrektion des Quecksilberbarometers. Pp. 357-370.
- Snellen, Maurits.** Einige Neuerungen an erdmagnetischen Messapparaten. Pp. 371-378.
- Perner, J[josef] M[aria].** Die Berechnung des Grösse der Wolkenelemente aus meteorologisch-optischen Erscheinungen. Pp. 378-389.
- Hellmann, G[ustav].** Ueber die Eintrittszeiten der täglichen Temperaturextreme. Pp. 389-403.
- Meteorologische Zeitschrift.** Braunschweig. Band 23. Aug., 1906.
- Hellmann, G[ustav].** Ein neuer registrierender Schneemesser. Pp. 337-339.
- Gockel, A[lbert].** Ueber den Ionengehalt der Atmosphäre. Pp. 339-344.
- Exner, Felix M.** Prof. J. Wiesners Beobachtungen über die photochemische Intensität der direkten Sonnenstrahlung und der diffusen Himmelsstrahlung während der partiellen Sonnenfinsternis am 30. August 1905 zu Friesach in Kärnten. Pp. 344-348.
- Sack, G.** Beobachtungen über die neutralen Punkte von Babinet und Arago in den Jahren 1903 und 1904. Pp. 348-351.
- Fényi, J.** Ueber Winddrehungen in Kalocsa. Pp. 351-357.
- Hegyfoky, J.** Die Schwankung der jährlichen Regenmenge in Ungarn. Pp. 358-362.
- Zuntz, N. u. a.** Höhenklima und Bergwanderungen in ihrer Wirkung auf den Menschen. Pp. 362-364.
- Doberck, W.** Resultate der meteorologischen Beobachtungen zu Hongkong 1894-1903. Pp. 367-368.
- Wasserhosen. Pp. 371-373.
- Grossmann, —.** Nochmals die horizontale Komponente der ablenkenden Kraft der Erdrotation. Das Hadley-Dovesche Prinzip ist doch im Unrecht. Pp. 373-374.
- Hann, J[ulius].** Resultate 8jähriger meteorologischer Beobachtungen zu Haifa, Palästina. Pp. 375-376.
- Hann, J[ulius].** Ueber den jährlichen Wärmeumsatz in Binnenseen. Pp. 377-378.
- Krebs, Wilhelm.** Die Erscheinung des Sonnenbildes beim höchsten Grade der Szintillation. P. 382.
- Mitteilungen von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten.** Berlin. 19 Band. 2 Heft.
- Regenmessungen in Togo. Pp. 131-140.
- Regenmessungen in Kamerun. Pp. 141-148.
- Resultate der meteorologischen Beobachtungen in Swakopmund im Jahre 1905. Pp. 149-150.
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- Uhlig, C.** Regenbeobachtungen aus Deutsch-Ostafrika. Pp. 164-180.
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- Fraunberger, Georg.** Studien über die jährlichen Niederschlagsmengen des afrikanischen Kontinents. Pp. 73-82.
- Endrös, Anton.** Die Seiche des Waginger Sees. Pp. 94-95.
- Physikalische Zeitschrift.** Leipzig. 7 Jahrgang. 1 Aug. 1906.
- Simpson, G[eorge] C.** Ist der Staub in der Atmosphäre geladen? Pp. 521-522.
- Chella, Silvio.** Messung des inneren Reibungskoeffizienten der Luft bei niedriger Temperatur. Pp. 546-548.
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- Hann, J[ulius].** Zur Meteorologie des Äquators nach den Beobachtungen zu Pará am Museum Goeldi. II. Pp. 1-63. (Jän. 1905.)
- Ficker, H[einrich] von, and Defant, A[lbert].** Ueber den täglichen Gang der elektrischen Zerstreuung und des Staubgehaltes auf dem Patscherkofel. Pp. 151-165. (Feb. 1905.)
- Zölss, Bonifaz.** Beiträge zur Kenntnis der atmosphärischen Elektrizität XVIII. Elektrizitätszerstreuung in Kremsmünster (1903 bis 1904). Pp. 189-331. (Feb. 1905.)
- Conrad, V[ictor].** Beiträge zur Kenntnis der atmosphärischen

- Elektrizität XIX.** Ueber den Zusammenhang der luftelektrischen Zerstreuung auf dem Sonnbllick mit den meteorologischen Elementen auf dem Gipfel und im Tale. Pp. 335-353. (Mar. 1905.)
- Mazelle, Eduard.** Beiträge zur Kenntnis der atmosphärischen Elektrizität. XX. Die Zerstreuung der atmosphärischen Elektrizität in Triest und ihre Abhangigkeit von meteorologischen Elementen. Pp. 399-501. (Apr. 1905.)
- Defant, Albert.** Gesetzmässigkeiten in der Verteilung der verschiedenen Tropfengrösse bei Regenfällen. Pp. 585-616. Mai 1905.)
- Perner, J[osef] M[aria].** Zur Theorie des von einer kreisförmigen Lichtquelle erzeugten Regenbogens. Pp. 785-801. (Juni 1905.)
- Perner, J[osef] M[aria].** Erklärung des fälschlich "weisser Regenbogen" benannten Bouguer'schen Halos. Pp. 917-934. (Juli 1905.)
- Exner, Felix M.** Ueber Druck und Temperatur bewegter Luft. Pp. 1271-1292. (Okt. 1905.)
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- Schweidler, E. R. v.** Beiträge zur Kenntnis des atmosphärischen Elektrizität. XXII. Luttelektrische Beobachtungen au Mattsee im Sommer 1905. Pp. 1705-1735. (Dez. 1905.)
- Das Wetter. Berlin.** 6 Jahrgang. Aug. 12, 1906.
- Krziz, A.** Das Reduzieren des Barometerstandes auf das Meeress-niveau. Pp. 361-363.
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- Schulze, Paul.** Ludwig Friedrich Kämitz. Pp. 169-175.
- Lindemann, —.** Die meteorologische Station auf dem Fichtelberg 1891-1905. Pp. 175-180.
- Klengel, Friedrich.** Die Niederschlagsverhältnisse von Deutsch-Südwestafrika. Pp. 180-183.
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- Smits, P. J.** Is de intensiteit van den Regenval periodiek? Pp. 55-61.
- Nell, Chr. A. C.** Nog iets over de statistiek der halo's. Pp. 61-63.
- Società Meteorologica Italiana.** Bollettino bimensuale. Torino. Serie 3. Vol. 25.
- Masini, Alberto.** Sulla probabile presenza di ceneri vesuviane nell' atmosfera a Bologna durante il periodo eruttivo dell' aprile 1906. Pp. 53-54.
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- RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.**
- By H. H. KIMBALL, Librarian.
- The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.
- Austria. Hydrographisches Amt, Pola.**
- ... Ergebnisse der meteorologischen Beobachtungen in Pola für das Lustrum 1901-1905. 32 pp. f°. Pola. 1906.
 - Jahrbuch der meteorologischen, erdmagnetischen und seismischen Beobachtungen. 1905. xxv, 151 pp. f°. Pola. 1906.
- Baden. Zentralbureau für Meteorologie und Hydrographie.** Jahres-Bericht 1905. 132 pp. f°. Karlsruhe. 1906.
- Belgium. Administration de l'Enseignement Supérieur, des Sciences et des Lettres.** L'Observatoire Royal de Belgique. 74 pp. 4°. Bruxelles. 1904.
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FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Barometric disturbances crossed the British Isles during the first, second, and third decades of the month, those of the first and second decades being of marked intensity. In the vicinity of the Azores high barometric pressure prevailed, except on the 21st and 22d and from the 27th to 31st, the lowest reported reading of the month, 29.60 inches, being noted

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Climatological atlas of India. xxxii, 120 pp. f°. [Edinburgh.] 1906.

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Quatrième conférence . . . St. Pétersbourg 1904. 211 pp. 4°. St. Pétersbourg. 1905.

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Statement concerning the regional rainfall of India. 9 pp. 8°. London. July, 1906.

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Report of the Director . . . 1903. 43 pp. 8°. [Liverpool] 1904.

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viii, 404 pp. 4°. Braunschweig. 1906.

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Taschenbuch für Flugtechniker und Luftschiffer. 2d ed. viii, 587 pp. 16°. Berlin. 1904.

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Statistics of New Zealand for the year 1905. Meteorology. 7 pp. f°. Wellington. 1906.

Observatoire St Louis (St. Hélier, Jersey).

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[Structure of terrestrial and planetary atmospheres.] (Russian) (Izvestia Russkago astronomicheskago obshchestva, St. Petersburg, 1906.) 36 pp. 8°. St. Petersburg. 1906.

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Anales. Section 2a. 1905. vii, 155 pp. f°. San Fernando. 1906.

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A practical treatise on lightning protection. iv, 5-63 pp. 12°. New York. 1883.

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on the 30th. Over the western Atlantic the weather was as a rule quiet. A tropical disturbance that appeared east of Barbados August 31, moved thence on a northwesterly course to the northern Bahamas by September 7, and there recurved northeastward will be discussed in the September REVIEW.

No severe wind storms visited the sea coasts and Great